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REMARKS

In the Office Action mailed September 8, 2003, claims 3-13 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Cao (U.S. Patent No. 6,396,607) in view of Aizawa (JP Application Publication 08-288902). The foregoing rejections are respectfully traversed.

Claims 3-13 are pending and under consideration.

Cao discusses multi-wavelength all-optical regenerators (MAR) used in an optical transmission system. The Cao apparatus is shown in Figure 1 of Cao. In col. 3, at line 67, through col. 4 at line 7 of Cao, the MARS 10 is discussed as "a photonic device that simultaneously performs the functions of reamplification, retiming, and reshaping of N wavelength division multiplexed channels in the optical domain without converting the received signal format from an optical signal to an electronic signal and back to an optical signal (a so-called o-e-o conversion) before retransmission along another section of an optical communication system".

Aizawa discusses a clock recovery device which regenerates "a clock signal directly synchronously with a bit period of an optical signal data string by extracting a beat signal of a laser beam output from two laser light sources as the clock signal" (English translation of Aizawa abstract).

In the Office Action, the Examiner asserts that Aizawa discusses a detector having the proposed components for use as a clock regeneration device (figures 1-4). Furthermore, the Examiner asserts that Aizawa discusses the clock regeneration circuit as having an optical filter (element 13), a circuit for regenerating a reference clock (element 14), a tunable optical filter (element 15), and a circuit for regenerating a clock and a phase comparator (elements 16 and 17).

However, as discussed in the Aizawa abstract, elements 13-1 to 13-7 are photocouplers rather than optical filters. Moreover, elements 14-1 and 14-2 of Aizawa are semiconductor optical amplifiers rather than circuits for regenerating clocks.

In addition, the attorney for applicants is advised that elements 15-1 and 15-2 are light (optical) filters having fixed wavelength characteristics rather than tunable wavelength characteristics, and that element 16 is a balanced optical receiver which converts optical

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signals input therein to an electrical signal, rather than phase comparator.

Moreover, an optical clock as an optical beat signal is generated in the optical couplers 13 of Aizawa, rather than an electrical clock signal.

The combination of Cao and Aizawa is multi-wavelength all-optical regenerators (MAR) used in an optical transmission system which includes a clock recovery device which regenerates a clock signal directly synchronously with a bit period of an optical signal data string by extracting a beat signal of a laser beam output from two laser light sources as the clock signal.

In contrast to the foregoing references relied upon, as shown in Figures 2 and 3 of the present application, the present invention converts signals from optical signals to electrical signals and compares the electrical signals with each other. Refer to elements 20 and 30 in Figure 3 of the present application, which are explained beginning on page 13 of the present specification.

Also in the present invention, the controller controls the delay adjuster according to the modulation phase detected by the detector so that the phases of the reference clock component and the clock component coincide with each other.

Neither of the foregoing references relied upon, either alone or in combination, discusses or suggests the feature of the present invention including the operation of the controller and the configuration of the detector.

Each of independent claims 3, 4, 5, 6, 9, 10, and 13 recites an optical signal processing device comprising "at least one delay adjuster", "a detector for detecting the modulation-phase of at least one of said plurality of optical signals", and "a controller controlling the delay adjuster according to said modulation-phase detected by said detector".

Each of independent claims 3 and 5 of the present application recites that the detector comprises "an optical filter for passing an optical signal having a reference wavelength", "a circuit for regenerating a reference clock according to said optical signal passed through said optical filter", "a tunable optical filter for passing an optical signal having an arbitrary wavelength", "a circuit for regenerating a clock according to said optical signal passed through said tunable optical filter", and "a phase comparator for comparing the phases of said reference clock and said clock".

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Claim 4 of the present application recites that the "detector" comprises "a tunable optical filter for passing an optical signal having an arbitrary wavelength", "a circuit for regenerating first and second clocks according to a first optical signal having a first wavelength passed through said tunable optical filter and a second optical signal having a second wavelength passed through said tunable optical filter, respectively", and "a phase comparator for comparing the phases of said first and second clocks".

Claim 6 of the present application recites that the detector comprises "a pulse light source for generating reference pulse light", "an optical filter for passing an optical signal having an arbitrary wavelength", and "a gain saturation device for accepting said optical signal passed through said optical filter and said reference pulse light".

Claim 6 of the present application further recites "said controller comprising a circuit for controlling said delay adjuster so that the average power of light output from said gain saturation device is reduced".

Claim 9 of the present application recites that the detector comprises "a first optical filter for passing an optical signal having a first wavelength", "a second optical filter for passing an optical signal having a second wavelength", and "a gain saturation device for accepting said optical signal passed through said first optical filter and said optical signal passed through said second optical filter".

Claim 9 of the present application further recites "said controller comprising a circuit for controlling said delay adjuster so that the average power of light output from said gain saturation device is reduced".

Claim 10 of the present application recites that the detector comprises "a pulse light source for generating reference pulse light", "an optical filter for passing an optical signal having an arbitrary wavelength", and "a saturable absorption device for accepting said optical signal passed through said optical filter and said reference pulse light".

Claim 10 of the present application also recites "said controller comprising a circuit for controlling said delay adjuster so that the average power of light output from said saturable absorption device is increased".

Claim 13 of the present application recites that the detector comprises "a first optical filter for passing an optical signal having a first wavelength", "a second optical filter for passing an optical signal having a second wavelength", and "a saturable absorption device for accepting said optical signal passed through said first optical filter and said optical signal passed through

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said second optical filter".

Claim 13 of the present application also recites "said controller comprising a circuit for controlling said delay adjuster so that the average power of light output from said saturable absorption device is increased".

Dependent claims 7, 8, 11, and 12 recite patentably distinguishing features of their own. For example, claim 7 recites "said reference pulse light has a clock frequency 1/N (N is a natural number) times the clock frequency of each of said plurality of optical signals".

Withdrawal of the foregoing rejections of claims 3-13 is respectfully requested.

There being no further outstanding objections or rejections, it is submitted that the application is in condition for allowance. An early action to that effect is courteously solicited.

Finally, if there are any formal matters remaining after this response, the Examiner is requested to telephone the undersigned to attend to these matters.

If there are any additional fees associated with filing of this Amendment, please charge the same to our Deposit Account No. 19-3935.

Respectfully submitted,

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